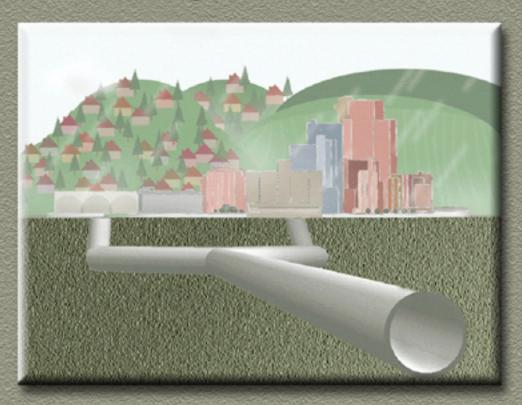
# - CSI PROJECT SOUTH LAKE WASHINGTON SUBREGIONAL PLANNING AREA

FINAL TASK 210 REPORT
PLANNING RECORD SUMMARY

FINAL TASK 220 REPORT - EXISTING FACILITIES
FINAL TASK 230 REPORT - EXISTING CONDITIONS

September 2003





Department of Natural Resources and Parks Wastewater Treatment Division

#### **Note:**

Some pages in this document have been purposefully skipped or blank pages inserted so that this document will copy correctly when duplexed.

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# KING COUNTY CONVEYANCE SYSTEM IMPROVEMENT PROJECT

# SOUTH LAKE WASHINGTON SUBREGIONAL PLANNING AREA

FINAL TASK 210 REPORT

PLANNING RECORD SUMMARY

September 2003



#### INTRODUCTION

This Task 210 Report describes the local and regional planning record for the planning area. The Conveyance System Improvements Project (CSI) is a comprehensive evaluation of the county conveyance system and an assessment of requirements to transport flows projected to the year 2050. This report identifies and evaluates specific King County regional wastewater conveyance system issues related to capacity limitations, as well as the system improvements or additions required to eliminate those limitations. Consideration has been extended to local service issues and projected growth. The Subregional Planning Area (SPA) described in this report is the South Lake Washington, shown in Figure 210-1.

The Urban Growth Area (UGA) boundary, adopted by King County in response to the State Growth Management Act (GMA) in 1998, excludes some areas included in the King County service area defined in the 1958 Metropolitan Seattle Sewerage and Drainage Survey. Changes and future growth projections within this planning area have spurred development of local sewerage systems and will be the source of future demands upon the regional conveyance system.

The 1958 Metropolitan Seattle Sewerage and Drainage Survey (referred to here as the 1958 Plan) was developed for the City of Seattle, King County, and the Washington State Pollution Control Commission between 1956 and 1958, to provide a long-range plan for the collection, treatment, and disposal of wastewater from the metropolitan Seattle area. The need for a long-range wastewater management plan was based on the rapid population expansion in King County and the increasing pollution of Lake Washington and other local surface waters. The planning horizon for the 1958 Plan was 2030, which corresponded with the longest economic life of any of the facilities likely to be constructed, and the population forecasts on which the plan was based were developed through that year.

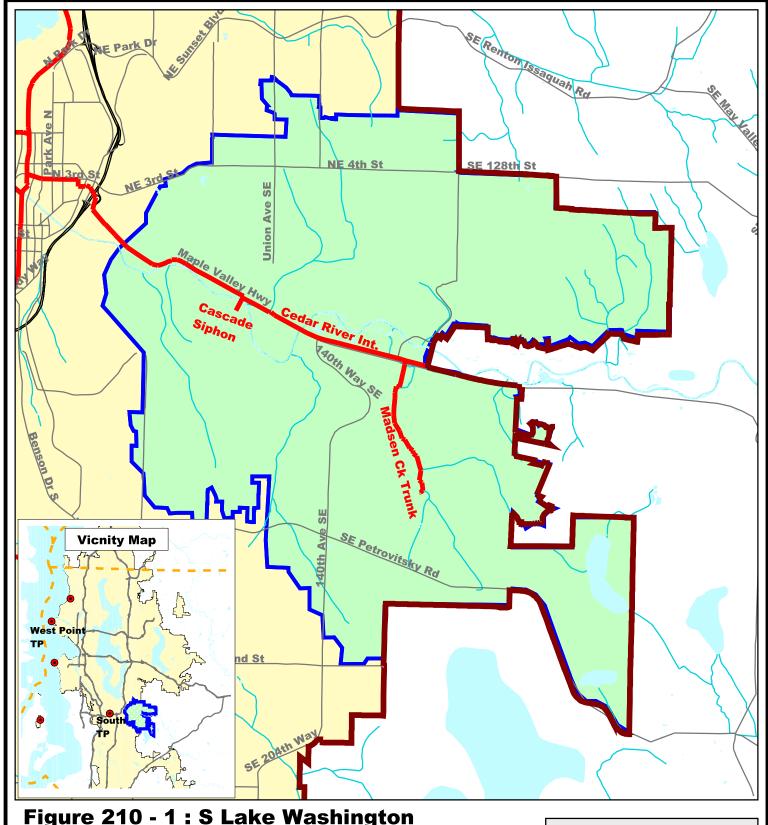
Figure 210-1 shows the King County sewer service area vicinity map, the UGA boundary, and County facilities within the S Lake Washington SPA.

The sections below describe the S Lake Washington SPA in relation to existing regional and local wastewater service areas. The description includes growth management impacts and local sewer service area boundaries, size, location, and population. The S Lake Washington SPA includes all local sewer basins tributary to the Cedar River Interceptor. Service area boundary changes and impacts are discussed. The 1958 Plan and amendments are compared to current planning in the S Lake Washington SPA. There are no *Regional Wastewater Service Plan* (RWSP) plan coordination issues in this planning area.

In a subsequent section, a brief summary of pertinent planning documents is presented to provide a historical reference for the S Lake Washington SPA. Factors that have contributed to long-term service planning for this area are discussed. Potential inconsistencies between these planning documents and the King County RWSP are noted.

Maps presented throughout this study show significant changes between the 1958 Plan and current service areas.

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# Figure 210 - 1 : S Lake Washington Subregional Planning Area

**KC Facilities and Vicinity Map** 

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# Legend 2002 UGA Boundary KC Conveyance Line Street Stream S Lake Washington SPA KC Service Area

#### REGIONAL WASTEWATER SERVICE AREA

King County, one city, and two water and sewer districts (WSD) have planning jurisdiction within the S Lake Washington SPA. Within the planning area, local service agencies provide local wastewater collection and convey flow to King County regional facilities. The UGA boundary, as identified in the *King County Comprehensive Plan*, defines the eastern boundary of the planning area. The UGA includes incorporated cities, developing suburbs, and most of the county's population and economic base. Most of King County's past growth has occurred in its cities and in unincorporated areas. Because future growth is encouraged in these areas, sewer service is limited to the UGA.

The S Lake Washington SPA includes part of the incorporated City of Renton and is approximately 8,500 acres in size. Figure 210-2 shows the city boundaries within the S Lake Washington SPA and the 2002 UGA.

Local sewer providers within the SPA include the City of Renton and Soos Creek WSD, and the Cedar River WSD. Sewer service agency and district boundaries are generally different from city limit boundaries and actual areas served. Local service agencies serve areas inside the boundaries of other service agencies under interlocal agreements. Figure 210-3 shows the sewer service agency boundaries of each local sewer service provider within the S Lake Washington SPA in addition to the Renton City limits. The Soos Creek planning area consists of 21 drainage basins. Portions of three Soos Creek drainage basins are within the boundaries of the S Lake Washington SPA. The Cedar River WSD serves drainage Area M. Both Soos Creek and Cedar River Water Sewer Districts serve drainage area P based on a cooperative agreement between the each district. The Cedar River WSD and the City of Renton serve the remainder of the S Lake Washington SPA.

#### **CURRENT KING COUNTY SERVICE BASINS**

Figure 210-4 shows the King County sewer basins as delineated in the 1994 Regional Wastewater Services Plan—Wastewater 2020 Plus, Existing Conditions report, major facilities, and existing county sewer lines. Portions of RWSP King County service basins CEDAR MOL, CEDAR MAD, SOOSN, SOOSCENT, RENTON CEDAR, RENTON ESI-1, and RENTON ESI-2 are within the SPA.

#### 1958 PLAN

The 1958 Metropolitan Seattle Sewerage and Drainage Survey set forth a comprehensive plan to provide gravity sewer service to the S Lake Washington SPA. The 1958 Plan was amended several times. Figure 210-5 shows the local service areas and the major sewer lines proposed by the plan within the South Lake Washington (SLW) Sewerage Areas as defined in the 1958 Plan. The 2002 urban growth area boundary is also shown. The SLW is the only sewerage area within the SPA. The service area includes parts of the City of Renton.

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Figure 210-6 compares the existing King County major facilities to the facilities shown in the 1958 Plan. There are several major changes as a result of planning since 1958. The 2002 urban growth area precluded sewer service to much of the eastern portion of the 1958 Sewerage Area. Neither the Cedar River Interceptor nor the Madsen Creek Trunk have been extended as far as proposed by the 1958 Plan.

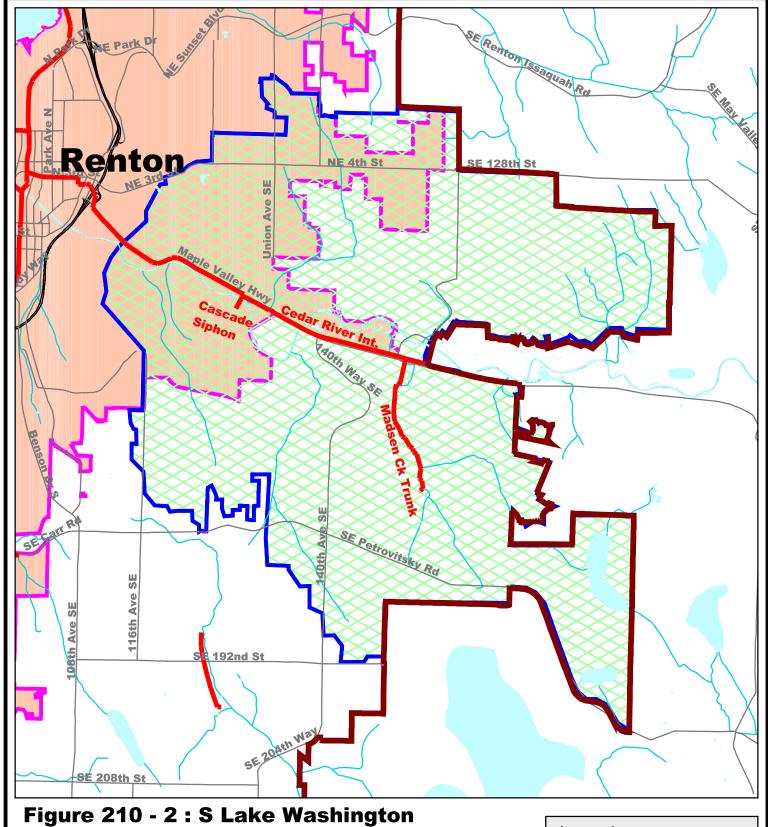
#### UNINCORPORATED KING COUNTY

A large portion of unincorporated King County is within the urban growth area located in the S Lake Washington SPA. Those areas are shown on Figure 210-2.

#### **URBAN GROWTH AREA**

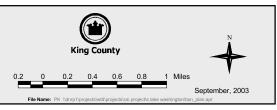
In response to the state Growth Management Act, the *King County Comprehensive Plan* defined an urban growth area, which generally reduced the 1958 planning area. The urban growth area boundary eliminates much of the eastern portion of the 1958 planning area. The S Lake Washington SPA has been defined entirely within the urban growth area. All figures show the urban growth boundary. Figure 210-6 shows the 1958 Plan Sewerage Areas and the 2002 urban growth area boundary.

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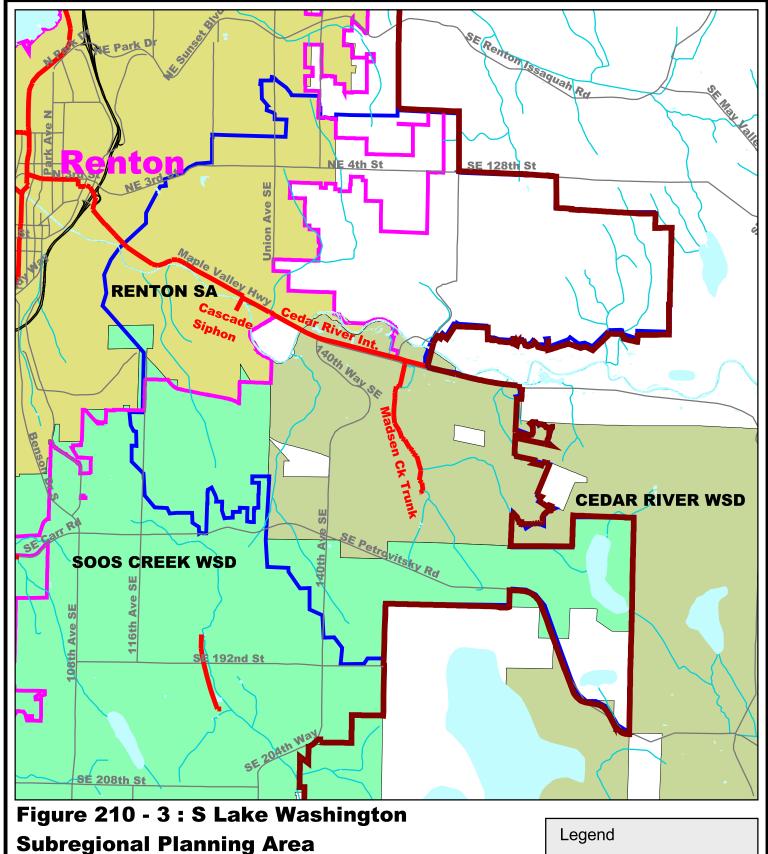


# Figure 210 - 2 : S Lake Washington Subregional Planning Area Cities

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# Legend 2002 UGA Boundary KC Conveyance Line Street Stream S Lake Washington SPA City of Renton

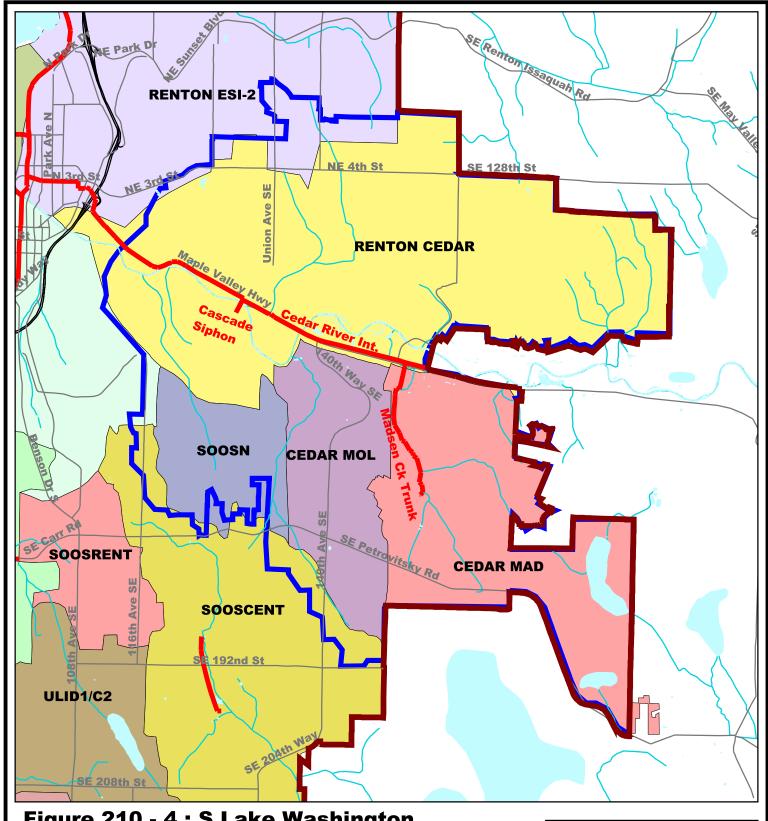


## **Subregional Planning Area Comparison of City and Sewer Agency Boundaries**

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### 2002 UGA Boundary KC Conveyance Line Street Stream City of Renton



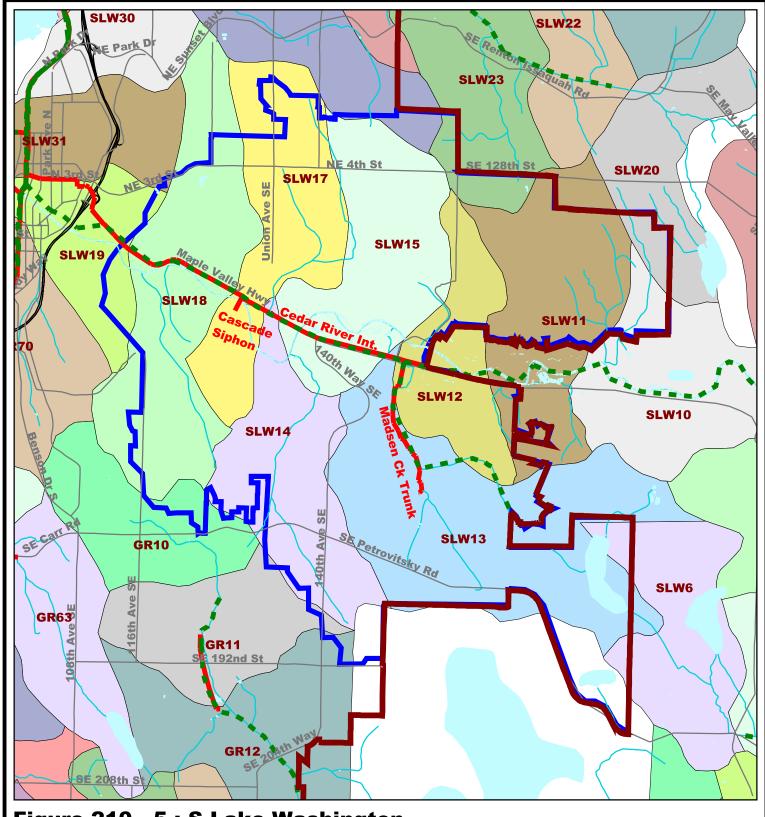
# Figure 210 - 4 : S Lake Washington Subregional Planning Area

**King County Sewer Basins** 

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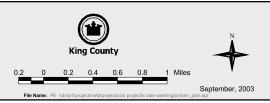


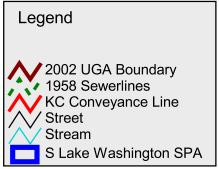


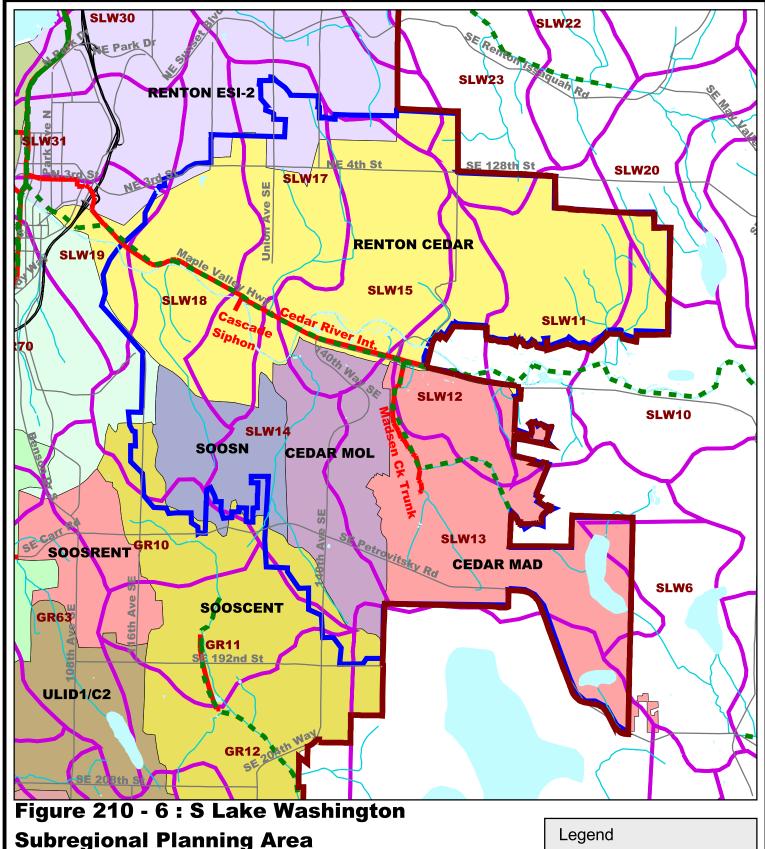
### Figure 210 - 5 : S Lake Washington Subregional Planning Area

1958 Plan: S Lake Washington Local Service Area and Service Sewers

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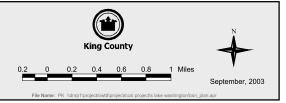






#### Comparison of 1958 Plan with Current KC **Sewer Basins and Interceptor**

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2002 UGA Boundary 1958 Sewerlines

KC Conveyance Line 'Street

Stream

S Lake Washington SPA

1958 Local Service Areas

#### LOCAL WASTEWATER SERVICE AREAS

#### CITY OF RENTON

The following information is from the *Long-Range Wastewater Management Plan, A Comprehensive Sewer System Plan – 1998*, City of Renton, May 1999 (prepared by City of Renton) and the *City of Renton Infiltration/Inflow Program*, March 1995 (prepared by Brown and Caldwell).

Figure 210-7 shows the city boundaries, local service areas, pump stations, and sewers for the City of Renton.

#### SERVICE AREA

A portion of the City of Renton service area is located in western portion of the S Lake Washington SPA. The City of Renton is the designated sewer service provider for this area. Soos Creek WSD and Cedar River WSD also provide service within the SPA. In 1999, the Renton service area was approximately 16.5 square miles and served about 45,000 people. Renton serves approximately 334 acres within the SPA.

#### **BASINS**

Renton serves several King County basins. The King County basins relevant to the S Lake Washington SPA are the RENTON ESI-1 and ESI-2, RENTON CEDAR, SOOSN, SOOSCENT, CEDAR MOL, and CEDAR MAD. The City of Renton includes nine local wastewater collection basins. Large portions of three basins are in the S Lake Washington SPA. A small portion of one other basin is within the SPA. The direction of flow is generally the same as the King County basins and as anticipated by the 1958 Plan.

#### SOOS CREEK WATER AND SEWER DISTRICT

The following information is from the 1996 Soos Creek Water and Sewer Plan dated January 1997 (prepared by Hedges & Roth Engineering, Inc.) and the King County GIS database.

Figure 210-7 shows the city boundaries, local service area, pump stations, and sewers for the Soos Creek WSD.

#### SERVICE AREA

The Soos Creek WSD is located in the southern portion of the S Lake Washington SPA. In 1996, the Soos Creek WSD service area covered approximately 68,000 acres and served about 18,818 people.

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The Soos Creek WSD provides sewer service for unincorporated King County and portions of the City of Renton. The King County GIS coverage shows the same service area for Soos Creek WSD that is shown in the Soos Creek WSD sewer comprehensive plan.

#### BASINS

Soos Creek WSD sewer service basins within the S Lake Washington SPA are generally subbasins within larger King County service basins as defined by the Soos Creek WSD comprehensive plan. SOOSCENT and SOOSN are the King County service basins that coincide with the Soos Creek WSD basins. Direction of flow from local basins is similar to the 1958 Plan

#### **CEDAR RIVER WATER AND SEWER DISTRICT**

The following information is from the *Cedar River Water and Sewer District 1991 Sewer System Comprehensive Plan* dated November 1991 (prepared by Hughes G. Goldsmith & Associates, Inc.).

Figure 210-7 shows the city boundaries, local service area and sewers for the Cedar River WSD.

#### SERVICE AREA

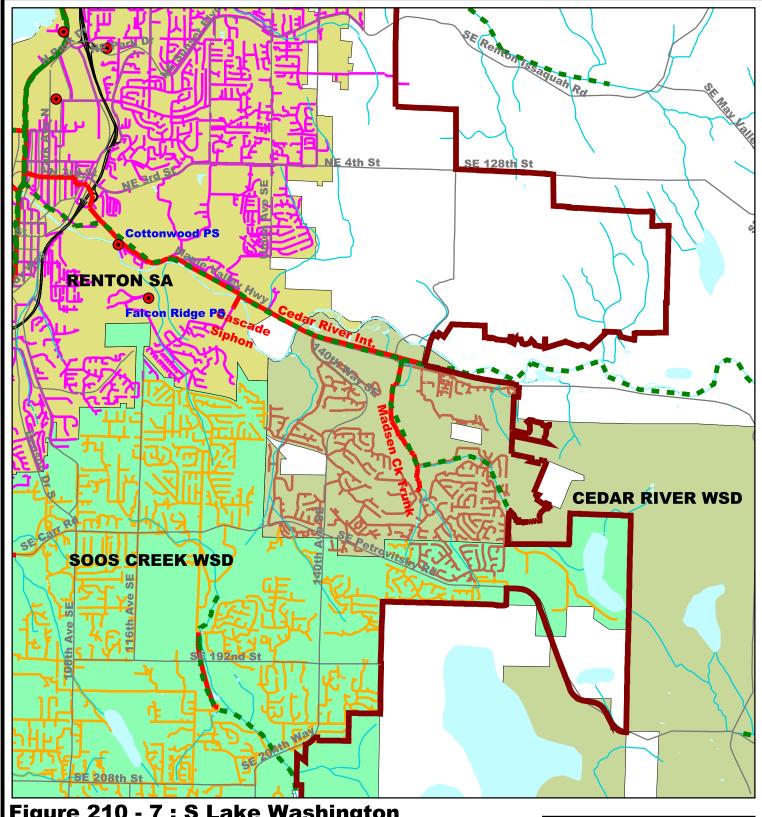
The Cedar River WSD is located in the southeastern portion of the S Lake Washington SPA. In 1991, the Cedar River WSD served about 15,172 people and covered about 7,481 acres.

The Cedar River WSD provides sewer service for Soos Creek WSD and private entities. The King County GIS coverage shows a different service area for Cedar River WSD than the information presented in the Cedar River WSD sewer comprehensive plan. The County GIS information is assumed to be more up-to-date and accurate than the information presented in the 1991 comprehensive plan.

#### BASINS

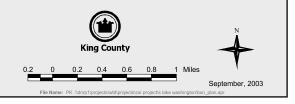
All or portions of Cedar River WSD drainage basins MOLASSES CREEK, VALLEY FLOOR, MADSEN CREEK, SHADY LAKE, and LAKE DESIRE are within the CEDAR MAD King County service basin. Direction of flow from local basins is similar to the 1958 Plan.

The area north of Cedar River Interceptor Section 4 is unsewered.



### Figure 210 - 7: S Lake Washington **Subregional Planning Area** Local Facilities: Renton, Soos Creek WSD and Cedar River WSD

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#### Legend

Renton Pump Stations 2002 UGA Boundary

1958 Sewerlines

KC Conveyance Line Street

Stream

Local Sewerlines CEDAR RIVER WSD **RENTON SA** 

SOOS CREEK WSD

#### PLANNING RECORD

The following planning documents provide a historical reference for the S Lake Washington SPA. This section describes factors that have contributed to long-term service planning for this area. Figures throughout this study show significant changes between the original and current service areas. Potential inconsistencies between these planning documents and the King County RWSP are noted in the Task 220 Report discussion of existing facilities and local agency planning.

#### 1958 METROPOLITAN SEATTLE SEWAGE AND DRAINAGE SURVEY

(March 1958, prepared by Brown & Caldwell)

The 1958 Metropolitan Seattle Sewage and Drainage Survey (referred to here as the 1958 Plan) was developed for the City of Seattle, King County, and the Washington State Pollution Control Commission between 1956 and 1958 to provide a long-range plan for the collection, treatment, and disposal of wastewater from the metropolitan Seattle area. The need for a long-range wastewater management plan was based on the rapid population expansion in King County and the increasing pollution of Lake Washington and other local surface waters. The planning horizon for the 1958 Plan was 2030, which corresponded with the longest economic life of any of the facilities likely to be constructed, and the population forecasts on which the plan was based were developed through that year.

The 1958 Plan divided the metropolitan Seattle area into 12 distinct Sewerage Areas. The divisions were based primarily on geography and economics but also included factors such as political boundaries, population distribution, land use, and location and condition of existing facilities.

The report concluded that the most economic and efficient solution to sewerage problems in the metropolitan Seattle area would be to convey sewage from large areas to a single point or relatively few points for treatment and disposal. The local service areas would be sewered with 6-inch to 24-inch service sewers. The service criteria then (and now) required service to be financially justifiable and required each local service area to contain no less than 1,000 acres.

The service sewers were planned to contribute to large feeder sewers, trunks, and interceptors within the Sewerage Area. The feeder sewers from the individual Sewerage Areas would convey the sewage to a treatment plant that would receive flow from many Sewerage Areas. Treated sewage would be pumped from the plant to an outfall for disposal in a designated body of water.

Construction timing in the 1958 Plan was based on urgency of the required facilities (including sewer mains) as a result of population growth or the need for pollution mitigation. Population forecasts and distribution were used to estimate construction timing and treatment plant loadings. Construction was planned to occur in three stages. Stage I, scheduled for the period from 1960 to 1970, included facilities required to alleviate serious pollution and flow-loading problems.

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Stage II, planned for 1970 to 1980, included extension of the collection and conveyance system to serve additional areas where the most rapid population growth was expected to occur. Stage III, scheduled for the period after 1980, included all remaining facilities required serving further population growth. The original schedule of work was subsequently amended to four phases.

Under the revised first stage of treatment system improvements (1960 to 1970), 28 small treatment plans were closed, and 46 primary treatment discharge points into Lake Washington and Lake Sammamish were eliminated. Three new primary treatment plants began operations, ranging from 3.2 million gallons per day (mgd) (Richmond Beach and Carkeek Park) to 125 mgd (West Point). Secondary treatment facilities were constructed at the South Treatment Plant at Renton, and more than 90 miles of large-diameter sewers, tunnels, and underwater pipelines were constructed.

The second stage of the plan (projects completed 1960 to 1990) was modified twice, in 1970 and in 1982. The second-stage plan included the following elements:

- South Treatment Plant, West Point, and Alki treatment plant improvements
- Eastgate trunk sewer and Issaquah interceptor construction
- Coal Creek, West Valley, and Lake Sammamish interceptor construction
- Two major combined sewer overflow (CSO) control projects
- Kenmore pump station construction
- North interceptor rehabilitation
- Juanita pump station modification.

The third-stage project facilities, completed in 1991, included three major efforts:

- West Point and South Treatment Plant upgrade projects
- Kenmore interceptor and Matthews Park pump station improvements
- Extension of North Creek and northeastern Lake Sammamish interceptors.

Subsequently, a fourth stage of wastewater projects was added, consisting of more than a dozen projects scheduled through 1997. Elements of the fourth-stage plan continued King County's move away from a decentralized system of several smaller treatment plants to a centralized system characterized by secondary treatment and only two large plants, at Renton (the South Treatment Plant) and West Point. The Richmond Beach plant was replaced with a pump station, and Alki and Carkeek facilities were converted to stormwater/CSO facilities with transfer of base sanitary flows to the West Point plant. Other fourth-stage projects include pump stations, regulators, tunnels, and conveyance and separation facilities.

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#### CODIFICATION OF METRO'S COMPREHENSIVE SEWERAGE PLAN

(November 1989, prepared by Brown & Caldwell)

This is a summary document of the 1958 Plan amending resolutions from 1961 through 1989. These amendments implemented the original plan and made some changes to it. None of the resolutions specifically modified plans to serve the S Lake Washington SPA.

#### WASHINGTON GROWTH MANAGEMENT ACT

As part of its planning process, King County must meet the requirements of the 1990 state Growth Management Act. This law directs affected counties, including King County, to develop comprehensive growth management plans to define urban growth boundaries and to ensure that facilities and services needed to sustain growth are in place when required. Implementation of the sewer comprehensive plans includes making capital investments, regulating land uses, and identifying and protecting environmentally sensitive areas and resource lands. The Growth Management Act directs counties and cities to adopt jointly prepared "county-wide planning policies." These regional policies are frameworks around which counties and cities develop sewer comprehensive plans.

King County's vision of the future, embodied in its County-Wide Planning Policies, was developed by the King County Growth Management Planning Council (GMPC), which consists of the King County executive, five members of the Metropolitan King County Council, three representatives of the City of Seattle, six representatives from the suburban cities, and one exofficio member representing the Port of Seattle. The County-Wide Planning Policies address issues such as siting of facilities, as well as timing and phasing of land development in concert with facilities and services. The King County Council adopted the County-Wide Planning Policies by Ordinance No. 10450 on July 6, 1992.

One of the major goals of the Growth Management Act is concurrency. Concurrency is defined to mean that, to the extent possible, specific infrastructure systems are in place at the same time development occurs. The concurrency goal is intended to make sure that development (population and employment growth) occurs initially in areas that have urban services available. If the infrastructure will not be in place to accommodate a minimum of 20 years of projected growth, the Growth Management Act requires that land use, financing mechanisms, or levels of service be reassessed. This reassessment ideally results in a balance of capital facilities, land use planning, and financing, and hence a concurrent accommodation of growth. Strict concurrence is required only for transportation elements but is a goal for all other infrastructure elements as well.

Concurrency for King County wastewater facility planning means that if sewer conveyance and treatment system infrastructure is not in place when needed, then levels of service (such as numbers of combined sewer overflows, discharge limits, or infiltration and inflow accommodation) should be reassessed.

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#### KING COUNTY COMPREHENSIVE PLAN, EXECUTIVE PROPOSED PLAN

(June 1994, prepared by King County Parks, Planning and Resources Department)

The Metropolitan King County Council established a UGA in the 1994 *King County Comprehensive Plan* (KCCP) and the 1995 amendment. Future growth and development should be confined to the UGA, as defined by the urban growth boundary, to limit urban sprawl, enhance open space, protect rural areas, and provide for more efficient use of human services, transportation, and utilities. The *King County Comprehensive Plan* includes capital facilities and utilities elements that contain a review and approval process for sewer plans within the county. King County's regional wastewater conveyance and treatment system and facilities are specifically included in the adopted comprehensive plan (provided in Volume One of the Technical Appendices).

The *King County Comprehensive Plan* indicates that within the UGA, construction of public sewers is encouraged, to allow the maximum density to be achieved. Public sewers should be provided to replace onsite treatment systems. The *County-Wide Planning Policies* restrict public sewer expansions in rural areas and on natural resource lands unless they are tightlined (no service laterals permitted) and a finding is made that no reasonable alternative technologies are feasible.

Ultimately, the *King County Comprehensive Plan* would confine concentrated development to the UGA, where services are already provided, or would require service to be provided concurrently with development. This can be accomplished by changing development patterns and zoning and by offering incentives to direct growth within the UGA.

#### KING COUNTY REGIONAL WASTEWATER SERVICES PLAN (RWSP)

(January 1996, prepared by King County Wastewater Treatment Division)

The RWSP is the King County long-range planning road map defining the strategy for providing regional wastewater services in the Seattle metropolitan area. The RWSP scope is comprehensive in nature, addressing wastewater treatment and conveyance needs, the combined sewer overflow control program, the biosolids management program, and opportunities for water reuse. The policies guiding the provision of wastewater services, as well as the programmatic initiatives and facilities needed to address those services, comprise the plan. The RWSP does not specifically examine the S Lake Washington SPA drainage.

#### KING COUNTY RWSP—WASTEWATER 2020 PLUS, EXISTING CONDITIONS

(August 1994, prepared by HDR Engineering, Inc.)

As part of a planning project to assess the long-term wastewater conveyance and treatment needs of King County, the *Wastewater 2020 Plus, Existing Conditions* report described capacity and limitations of existing wastewater conveyance and treatment facilities through 1996. The report

determined the impacts of infiltration and inflow and provided alternatives for management of infiltration and inflow. The study developed wastewater flow projections and forecast conveyance and treatment facility needs based on population forecasts reflecting 1990 census data, economic conditions, and growth management visions. Wastewater conveyance and treatment needs were examined in a broad regional context to assess mutually beneficial opportunities for service arrangements with other counties. The study provided planning level analysis of system conveyance and treatment facility needs.

## CEDAR RIVER WATER AND SEWER DISTRICT 1991 SEWER SYSTEM COMPREHENSIVE PLAN

(November 1991, prepared by Hugh G. Goldsmith & Associates, Inc.)

The Cedar River Water and Sewer District Sewer Comprehensive Plan examines the condition and performance of the existing system and improvements to meet current needs in the ten years that follow the release of the report and the projected needs beyond 2001. The report also examines preliminary aspects of major improvements required beyond the planning period, so that proper service could be provided should future County land use decisions modify the community's plans and change the boundaries of existing Sewer Local Service Areas.

## 1996 Soos Creek Water and Sewer District Comprehensive Sewer Plan

(January 1997, prepared by Hedges & Roth Engineering, Inc.)

The *Soos Creek Water and Sewer District Comprehensive Sewer Plan* established a planning area, discussed and evaluated existing conditions, and discussed operations and maintenance. The plan also identified system requirements, recommended improvements, and proposed a plan for implementation of improvements.

## CITY OF RENTON LONG-RANGE WASTEWATER MANAGEMENT PLAN, A COMPREHENSIVE SEWER SYSTEM PLAN – 1998 DRAFT

(May 1999, prepared by City of Renton)

The *City of Renton Long-Range Wastewater Management Plan* described the existing system, provided a topographic map, discussed operations and land use policies, discussed system analysis and results, recommended proposed improvements, and discussed financial analysis. It also discussed analysis and design criteria, inflow and infiltration, and operation and maintenance. It lists service agreements with King County, Newcastle, Soos Creek WSD, Issaquah School District, Coal Creek WSD (formerly WD No. 107), WD No. 90, Skyway WSD, and Cascade SD, which is now part of Soos Creek WSD.

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#### CITY OF RENTON INFLOW / INFILTRATION PROGRAM

(March 1995, prepared by Brown & Caldwell)

The City of Renton Inflow / Infiltration Program describes the Renton service area characteristics including political and service area boundaries, land use and zoning, physical environment, and drainage. It discusses collection system characteristics including the existing and future collection system and the aquifer protection ordinance. It describes the flow monitoring program and flow data analysis and presents hydrologic simulation modeling results. The discussion of conclusions and recommendations includes description of the proposed future infiltration and inflow control program, as well as methods for source detection, source identification, and sewer rehabilitation. It discusses program funding options and presents financial guidelines.

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# KING COUNTY CONVEYANCE SYSTEM IMPROVEMENT PROJECT

# SOUTH LAKE WASHINGTON SUBREGIONAL PLANNING AREA

FINAL TASK 220 REPORT

**EXISTING FACILITIES** 

September 2003



# INTRODUCTION

This Task 220 Report describes existing sewerage facilities, known rehabilitation requirements, planned system changes, and operation and maintenance within the S Lake Washington SPA. The discussion is divided into King County's regional facilities and facilities owned by local service agencies (local sewer agencies). Potential inconsistencies between local agency planning and other planning records described in the Task 210 Report are discussed.

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# REGIONAL FACILITIES

King County owns and operates one interceptor, one siphon, and one trunk and no wastewater pump stations in the S Lake Washington SPA. Figure 210-1 shows the King County facilities in the SPA. Wastewater facilities are located in King County's East Section service area, which contains approximately 90,000 sewered acres, extending from Juanita/Kirkland and Woodinville in the north to the Pierce/King County border. All East Section flow is treated at the South Treatment Plant in Renton. This section describes key King County facilities that serve the S Lake Washington SPA, as well as issues and problems.

### **WASTEWATER TREATMENT FACILITIES**

There are no wastewater treatment facilities in the S Lake Washington SPA.

### **CONVEYANCE FACILITIES**

King County owns and maintains approximately 21,000 linear feet of sewers within the S Lake Washington SPA. About 14,700 linear feet of the Cedar River Interceptor is within the S Lake Washington SPA. The entire length of the Madsen Creek Trunk (6,500 linear feet) is within the S Lake Washington SPA.

The Cascade Siphon conveys flow across the Cedar River to the Cedar River Interceptor. A siphon inlet structure is located near Royal Hills Drive SE along a dirt road just before the Royal Hill Apartments. The siphon outlet structure is located along the Cedar River Interceptor at manhole R10-32.

Section 4 of the Cedar River Interceptor was constructed to serve leachate flow from the Cedar Hills Regional Landfill. Leachate flow is pumped to the Cedar River Interceptor and the quantity of flow increases in winter months.

### **PUMP STATIONS**

There are currently no King County pump stations within the S Lake Washington SPA.

#### COMPARISON TO 1958 PLAN

Existing King County facilities have been built according to the sewer comprehensive plan defined by the 1958 Plan except that the Madsen Creek Trunk was not constructed to the extent indicated in the 1958 Plan. Facilities SLW-14 and SLW-15 as described by the 1958 Plan, include about 13,400-linear feet of sewer pipe and correspond to the Madsen Creek Trunk. The Madsen Creek Trunk currently includes about 6,500-linear feet of sewer pipe.

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### **ISSUES AND PROBLEMS**

The following text summarizes issues and problems associated with the S Lake Washington SPA.

# MADSEN CREEK TRUNK

The Madsen Creek trunk has experienced several problems since construction. Erosion has exposed several sections of the trunk and has undermined supports at stream crossings. The pipeline has been compromised in the past and has released sewage directly into Madsen Creek. As a result, King County is in the process of designing a gravity sewer located in the Fairwood Community called the Fairwood Interceptor. The Madsen Creek Trunk will be abandoned when the Fairwood Interceptor begins service sometime in 2005.

# LOCAL FACILITIES

There are no local wastewater treatment facilities in the S Lake Washington SPA. All wastewater is conveyed to the South Treatment Plant at Renton. This section describes Renton, Cedar River WSD, and Soos Creek WSD facilities within the S Lake Washington SPA. It notes discrepancies between local planning and other planning records described in the Task 210 report.

### CEDAR RIVER WATER AND SEWER DISTRICT

Figure 210-7 shows the Cedar River WSD boundaries and local service area for the district. The Cedar River WSD serves a small area within Renton, while the majority of its service area is in urban unincorporated King County. Land use designations are predominantly residential. The Cedar River WSD has specific service agreements with the Soos Creek WSD.

The Cedar River WSD is divided into three regional areas designated west, central, and east. Portions of the west and central regional areas are within the S Lake Washington SPA. The Cedar River WSD planning area is further divided into 24 drainage basins. The Cedar River WSD basins do not correlate to the King County basins very well. Correlation is also not very good between Cedar River WSD basins and 1958 Plan basins.

The Cedar River WSD covers approximately 8,521 acres. Only a portion of the Cedar River WSD is within the S Lake Washington SPA. The sewer district service area boundary differs from the King County service area boundary to the north, east and southeast edge of the boundary.

### **CONVEYANCE FACILITIES**

Gravity sewers serve three of the twenty-four drainage basins in the Cedar River WSD. Each basin is served by a trunk sewer discharging to King County's Cedar River Interceptor located along the Maple Valley Highway. These county sewers are the Cascade Siphon, the Madsen Creek Trunk, and the Cedar River Interceptor.

The Cedar River WSD owns and maintains approximately 37 miles of sewer service piping ranging is size from 6 to 21 inches in diameter. Most of the system is concrete or reinforced concrete pipe. Cast or ductile iron, polyvinyl chloride (PVC), and a small quantity of asbestoscement pipe make up the remainder of the system. There are approximately 950 manholes within the system.

### PUMP STATIONS

There are no Cedar River WSD pump stations located in the S Lake Washington SPA. The Cottonwood Pump Station is located west of the Riviera Apartments, south of the Maple Valley

Highway. It delivers to the Cedar River Interceptor and is a recessed, wet well mounted, duplex lift station. This facility serves the area between the Maple Valley Highway and the Cedar River, east of the Stoneway Concrete facilities.

The Falcon Ridge Pump Station is located at the east end of SE 8<sup>th</sup> Street in the plat of Falcon Ridge. The facility is fiberglass enclosed, wet well mounted duplex system with a duplex vacuum priming system. The associated forcemain is long and has an excessively high head. The facility can be taken off-line and removed after the development of the Parker property and completion of the Falcon Ridge Interceptor. In this situation, wastewater is conveyed directly to the Cedar River Interceptor.

Table 220-1 lists and describes the major pump stations relevant to regional sewer service in the S Lake Washington SPA.

## KNOWN REHABILITATION REQUIREMENTS

A maintenance crew inspects and cleans every manhole within the district system annually. The District's goal is to clean 20-percent of the total system piping annually. Cleaning is accomplished with a high pressure jetting truck operated by a cleaning contractor who is engaged once a year for a two-week period. A limited amount of remote television inspections have been performed to investigate problems noticed by crews performing routine inspections.

Deterioration of manhole channels and storm inflow and leakage was observed during manhole cleaning and inspections. Installation of bolts in manhole covers was accomplished in 1989 to seal and prevent inflow. For new construction or replacements, solid type manholes will be installed.

### PLANNED SYSTEM CHANGES

According to the comprehensive plan, as much as 80,220 linear feet of new sewers are planned within the Cedar River WSD. In addition, three pump stations and forcemains are also planned. The first pump station and forcemain will serve a planned development along Lake Desire and will discharge into existing local sewers. A second pump station and forcemain will serve the Spring Lake area.

### COMPARISON TO 1958 PLAN

Existing King County facilities within the S Lake Washington SPA have been built according to the sewer comprehensive plan defined by the 1958 Plan and subsequent amendments adopted by resolution.

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Table 220-1. Pump Stations Significant to Local Sewer Service in S Lake Washington SPA

Name		Number		Pump	Force Main					
(Number) and	Type of	of	Capacity	Size	Size		Emergency			TDH
Location	Station	Pumps	(gpm)	(inches)	(inches)	Destination	Power	Year Built	Remarks	(feet)
CITY OF REN	ΓΟΝ									
Cottonwood	Submersible	2	230		6	Cedar River Interceptor	Yes	1994		32
Falcon Ridge	Wetwell Mounted	2	100		4	Cedar River Interceptor via Gravity Sewer	Yes	Unknown		101

# SOOS CREEK WATER AND SEWER DISTRICT

The following information is from the 1996 Soos Creek Water and Sewer District Comprehensive Sewer Plan dated January 1997 (prepared by Hedges & Roth Engineering, Inc.).

Figure 210-7 shows Soos Creek WSD boundaries and local service area for Soos Creek WSD. Only a small portion of the Soos Creek WSD is within the S Lake Washington SPA. Land use designations are predominantly residential (generally four to eight dwelling units per acre). The Soos Creek WSD has specific service agreements with the Cedar River WSD.

The Soos Creek WSD is divided into three major service areas designated north, southeast, and southwest. The portion of the system within the S Lake Washington SPA has approximately ten discharge points through CEDAR MAD, CEDAR MOL, and RENTON. The Soos Creek WSD has specific service agreements with Cedar River WSD. The service areas are further divided into 21 drainage basins. The Soos Creek WSD basins can be correlated to the King County basins fairly well. Correlation is lower between Soos Creek WSD basins and 1958 Plan basins.

### **CONVEYANCE FACILITIES**

According to the sewer comprehensive plan, the Soos Creek WSD maintains approximately 350 miles of gravity sewer ranging in size from 6-inch to 27-inch diameter. About 58 percent of the pipe is 8-inch diameter. Most of the system is concrete or reinforced concrete pipe, with newer pipe that is predominantly polyvinyl chloride (PVC). There are approximately 6,667 manholes.

The service area of the Soos Creek WSD that is served by the Cedar River WSD is made up of mostly 8-inch and smaller gravity sewer in addition to a small amount of 12-inch gravity sewer.

### **PUMP STATIONS**

There are 24 functioning lift stations within the Soos Creek WSD but none of them are within the S Lake Washington SPA.

Soos Creek WSD Pump Station #5 is located at the end of the Clark Fork Trunk and discharges to the Cedar River Interceptor or the South Renton Trunk.

# KNOWN REHABILITATION REQUIREMENTS

It is anticipated that about 28 percent of the gravity sewer installed before the mid-1970s will need replacement in the next 10 to 15 years.

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### PLANNED SYSTEM CHANGES

No changes are planned within the service area of the Soos Creek WSD that is within the S Lake Washington SPA.

### **OPERATION AND MAINTENANCE**

The Soos Creek WSD has a mutual aid agreement with other participating WSDs to provide personnel and equipment to the other districts that request assistance during emergencies. The Cedar River WSD staff performs maintenance.

### COMPARISON TO 1958 PLAN

Existing King County facilities within the S Lake Washington SPA have been built according to the sewer comprehensive plan (defined by the 1958 Plan and subsequent amendments adopted by resolution).

### CITY OF RENTON

The following information is from the *City of Renton Long-Range Wastewater Management Plan, A Comprehensive Sewer System Plan – 1998 Draft,* City of Renton, May 1999 (prepared by City of Renton), and the *City of Renton Infiltration/Inflow Program*, City of Renton, March 1995 (prepared by Brown & Caldwell), in addition to information provided by King County.

Figure 210-7 shows the city boundaries, local service area, pump stations, and sewers for the City of Renton. Only the southeast portion of Renton is included in the S Lake Washington SPA. Land use in the planning area is governed by the City of Renton.

### **CONVEYANCE FACILITIES**

Flow is collected by approximately 158 miles of gravity sewer and force main in Renton serving seven major basins. All or portions of the East, West and Lower Cedar River basins are located within the S Lake Washington SPA. Flow is discharged to King County facilities at 67 locations within the entire service area. Sewers are primarily 8-inch diameter but also include pipes sized from 6 inches to 30 inches. Renton serves approximately 94 percent of its population through about 11,129 connections. Sewers are generally concrete or PVC.

### **PUMP STATIONS**

The district owns and operates 21 pump stations. The Cottonwood and Falcon Ridge stations are within the S Lake Washington SPA. See Table 220-1 for information on Renton pump stations relevant to the S Lake Washington SPA.

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### KNOWN REHABILITATION REQUIREMENTS

Renton proposes several rehabilitation projects within the S Lake Washington SPA. The Falcon Ridge and the Cottonwood lift stations are scheduled for rehabilitation or replacement.

### PLANNED SYSTEM CHANGES

The City of Renton is planning several improvements within the current service. The City of Renton is currently negotiating with Coal Creek WSD to set service boundaries along their common borders.

The City is planning on installing an East Cedar River Collection System and Eastern and Central Plateau Interceptors. They are also planning to extend the Union Avenue NE Sewer main and to replace the Presidents Park sewer. Also, the Falcon Ridge Pump Station will be replaced with a gravity sewer connecting to the Cedar River Interceptor.

### COMPARISON TO 1958 PLAN

Existing King County facilities have been built according to the sewer comprehensive plan defined by the 1958 Plan and amendments subsequently adopted by resolution. The interceptor proposed in 1958 paralleling May Creek has not been constructed.

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# KING COUNTY CONVEYANCE SYSTEM IMPROVEMENT PROJECT

# SOUTH LAKE WASHINGTON SUBREGIONAL PLANNING AREA

FINAL TASK 230 REPORT

**EXISTING CONDITIONS** 

September 2003



# INTRODUCTION

This section characterizes the physical and natural environment, known sensitive areas, and the general natural resources located in the South Lake Washington Subregional Planning Area (S Lake Washington SPA). This planning and project identification effort includes a description of geological, physical, biological, and other environmentally sensitive conditions in the planning area that may affect construction of wastewater conveyance systems to extend current service capabilities. Current and future land use and growth conditions in the planning area are also briefly identified.

Local sewer providers include the City of Renton, the Soos Creek WSD, and the Cedar River WSD. The S Lake Washington SPA includes part of the City of Renton. Information used to prepare this section includes relevant data from the city of Renton; the Cedar River Sewer District and the Soos Creek WSD; King County; the Puget Sound Regional Council; and consultant reports.

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# **NATURAL ENVIRONMENT**

The S Lake Washington SPA is located south of Lake Washington along the Cedar River, within King County and a portion of the City of Renton known as the Fairwood neighborhood.

King County requires protection of the natural environment and public health and safety in the county through its environmentally sensitive areas regulations (King County 2002). The sensitive areas regulations contain development standards regarding wetlands; streams; erosion, flood, and seismic hazard areas; and other environmentally sensitive areas. Local jurisdictions in King County are also required to develop and implement sensitive areas ordinances within their municipal boundaries. Wastewater system planning and construction of conveyance systems and facilities in the S Lake Washington SPA must occur in accordance with the requirements of these regulations and ordinances.

A summary of sensitive areas and other natural resources identified by King County in the S Lake Washington SPA are discussed in the sections below.

### **GEOLOGICAL FEATURES**

### TOPOGRAPHY AND SOILS

The topography of the planning area includes portions of relatively flat to moderately sloping uplands, moderate to steep hillslopes, and the flat Cedar River floodplain. Elevation in the western portion of the SPA ranges from 75 feet in the floodplain along the Cedar River to up to 580 feet (Penhallegon 2000). The north and south portions of the SPA are relatively flat, with slopes ranging from zero to 40-foot elevations. However, around the Cedar River slopes are significantly steeper, ranging from zero to over 400 feet, where several plateaus are present (KC 2003).

Surficial geology in the SPA is diverse. Two main types of geology make up the majority of the planning area: glacial till and recessional outwash deposits, which constitute the majority of the north and south portions of the planning area. Throughout the center of the SPA and concentrated around the Cedar River valley, several additional soil types are present (King County 2003a):

- Younger alluvium
- Mass-wastage deposits
- Sedimentary deposits
- Advance outwash deposits
- Undivided Vashon Drift
- Miocene and Oligocene sandstone

- Ice-contact deposits
- Intrusive rocks
- Renton formation.

A large portion of the soil association in the S Lake Washington SPA is the Beausite Alderwood Association (USDA 1973). This type of soil is well drained to moderately well drained, and gently rolling to very steep. Undulating hills with dense, slowly permeable glacial till are also characteristic of this soil type, which are located generally on uplands and terraces (Penhallegon 2000). At a depth of 20 to 40 inches, these soils consist of shale sandstone or dense, permeable glacial till (Penhallegon 2002).

The Everett Association also constitutes a small portion of the SPA. Everett soils are excessively drained and gravelly, and are underlain by sand and gravel. This soil type is generally located within the SPA on gently undulating soil terraces (Penhallegon 2002). Other soils are muck, silt, loam, sandy loams, and mixed alluvial sand.

Long abandoned coal mines are present in the area between Renton and Maple Valley. Four specific coal mine areas have been identified by King County (2003a), which occur within the SPA. The northern side of Lake Desire and smaller areas on the west side of the SPA are considered sensitive areas by King County as coal mine safety hazards. These coal mining areas may be potential public safety hazard areas.

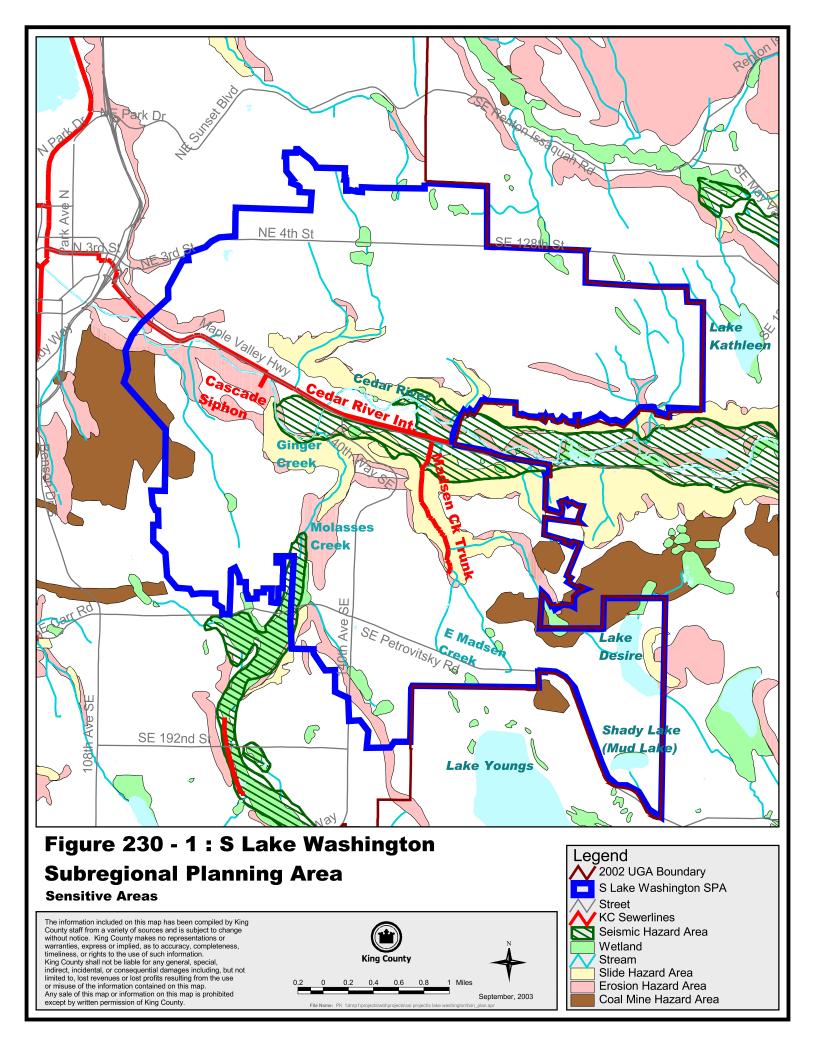
Planning area geology and soils, including seismic, landslide, and erosion hazard sensitive areas, are shown in Figure 230-1.

### **EROSION HAZARDS**

The susceptibility of any soil type to erosion depends on the physical and chemical characteristics of the soil, its vegetative cover, slope length and gradient, intensity of rainfall, and the velocity of surface water runoff.

Eleven erosional hazard sensitive areas that have been identified by King County occur within the SPA (King County 2003a). The erosional hazard areas within the SPA are mainly concentrated around the Cedar River and its tributaries (King County 2003a). The east side of Lake Desire also experiences potential erosion hazard, as identified by King County (2003a).

Activities associated with clearing, grading, and construction can potentially contribute to erosion and sedimentation in the Cedar River floodplain. Proper erosion and sedimentation control measures should be implemented during construction activities to minimize construction impacts. Following construction, the disturbed site should be stabilized and revegetated, and drainage systems should be installed to further minimize any long-term erosion, sedimentation, and related impacts.



### LANDSLIDE HAZARDS

Landslide hazard areas have slopes greater than 15 percent, impermeable soils, and ground water seepage. Areas with a history of rapid stream incision, stream bank erosion, or undercutting by wave action, as well as areas with a geological history that would indicate landslide susceptibility, are also designated as landslide hazard areas by King County. For instance, the 2001 Nisqually earthquake triggered a landslide on the north side of the Cedar River in Renton. The slide crossed the lower Cedar River, filling approximately 600 feet of the channel with mud and debris. The backup of debris caused major flooding in the Renton area. Renton streets crews opened a different channel around the slide. The area of the former side channel (now a part of the main channel) is currently unstable. Several large trees have been undercut by the river and have fallen into the river.

Within the S Lake Washington SPA, the two main landslide hazard areas are located along the Cedar River and the east side of Lake Desire. One small landslide hazard area is also located in the southwest portion of the SPA. This small landslide area is not associated with any major waterbody.

Madsen Creek, a tributary to the Cedar River, has also experienced erosion problems. King County has stabilized a portion of the creek, where a severely eroded ravine threatened to rupture a sanitary sewer line (King County 2003b).

### SEISMIC HAZARDS

Seismic hazard areas are subject to severe risk of earthquake damage because of settlement or soil liquefaction. These conditions occur in areas underlain by soils with low cohesion and density, and are usually associated with a shallow ground water table. When shaken by an earthquake, these soils can lose their ability to support loads. Loss of soil strength can result in failure of the ground surface and damage to or collapse of structures supported in or on the soil. Loose, water-saturated soil materials are the most susceptible to ground failure due to earthquakes.

Two main areas with a high risk of seismic hazard that were identified by King County (2003a) or by the City of Renton (1993) occur within the S Lake Washington SPA. The largest area of seismic hazard is concentrated around the Cedar River, in the center of the SPA. This seismic area occurs along the south side of Maple Valley Road and continues along the Cedar River corridor (see Figure 230-2). The second distinct seismically hazardous area occurs in the lower southwest portion of the SPA, around a small waterbody directly east of the intersection of 28<sup>th</sup> Avenue SE and SE Petrovitsky Road.

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### **WATER FEATURES**

Rivers, lakes, wetlands, and other features are located within the S Lake Washington SPA. Surface water features identified by King County within the S Lake Washington SPA are shown in Figure 230-3 and discussed briefly below.

### SHORELINE AND SENSITIVE AREA REGULATION OF WATER BODIES

The S Lake Washington SPA is partially within the City of Renton. The main waterbody within the SPA is the Cedar River, which runs from east to west directly through the middle of the SPA. Madsen Creek, a major tributary to the Cedar River, is located east of Renton, within the SPA. Madsen Creek is the receiving water for the neighborhood of Fairwood surface water runoff (R.W. Beck 1998). In the southern portion of the SPA, Lake Desire and Shady (or Mud) Lake are present. Lake Youngs and Lake Kathleen, also located within the Cedar River watershed, are outside of the SPA and therefore not discussed further in this report.

The Cedar River classifies as a "shoreline of the state" under the Washington Shoreline Management Act (RCW 90.58), as well as under local shoreline master programs. Under the City County Sensitive Areas Ordinance, the Cedar River shoreline is classified as a Conservancy area (King County 2003a).

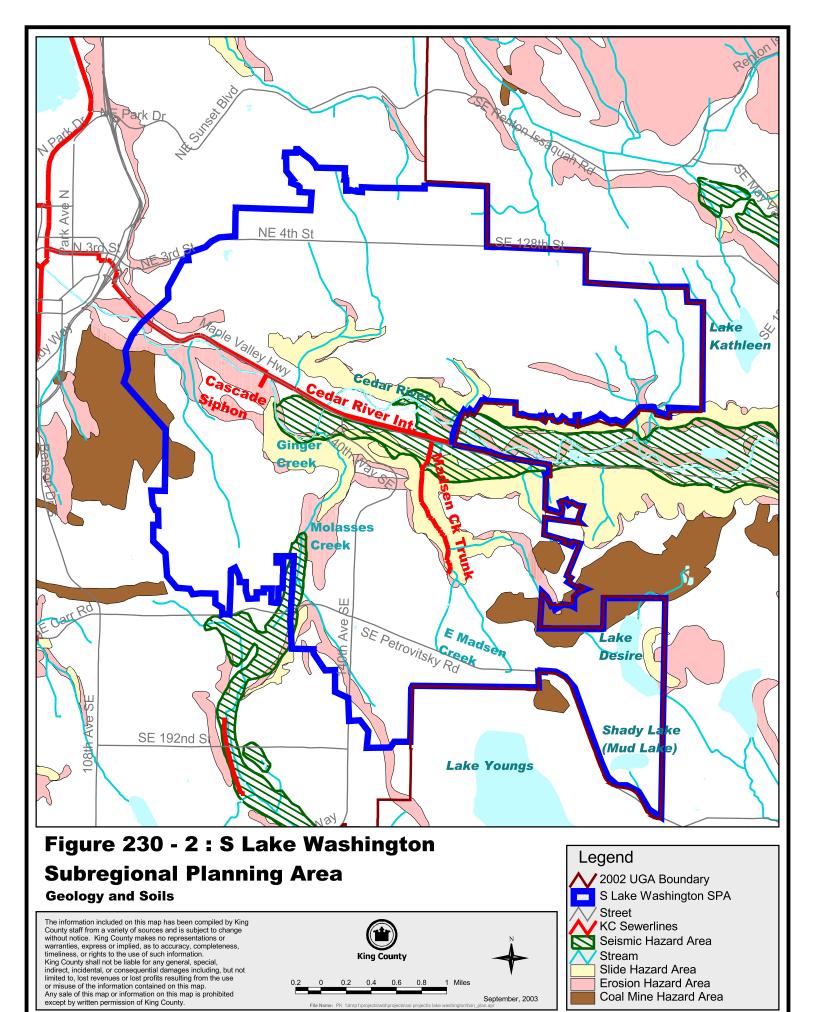
Any alteration of a shoreline of the state must be consistent with the local jurisdiction's shoreline master plan. The shoreline regulations that apply to these areas vary by location and jurisdiction, but they generally discourage development close to shorelines where alternative locations can be used.

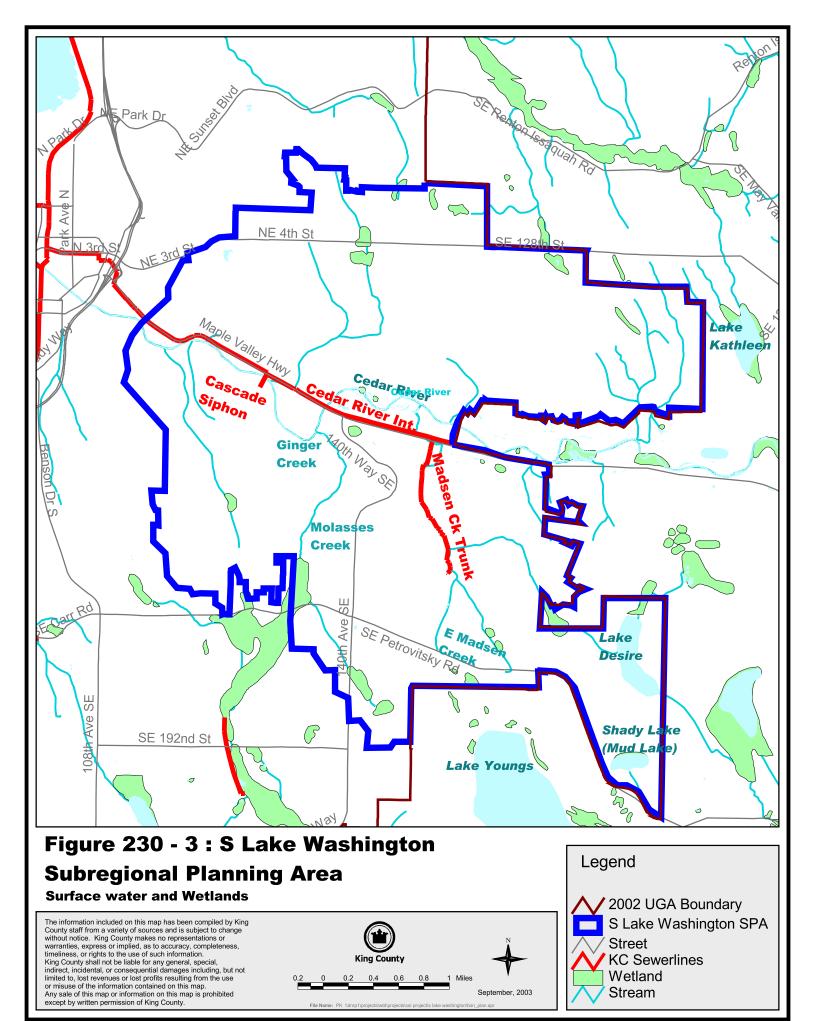
As a tributary to Lake Washington, the Cedar River is classified as Class AA "Extraordinary" by the Washington State Department of Ecology (Ecology) in terms of domestic and industrial water supply, fish and shellfish (rearing, spawning, and harvesting), wildlife habitat, swimming, and boating. The river is rated as Class 1 under the King County Sensitive Area Ordinance (King County 2002). Development within 100 feet of the Cedar River shoreline is generally prohibited or severely restricted in the unincorporated areas of King County.

### DRAINAGE BASINS AND STREAMS

The primary waterbody in the S Lake Washington SPA is the Cedar River, which runs from east to west through the center of the SPA. There are three main tributaries to the Cedar River within the SPA: Ginger Creek, Molasses Creek, and Madsen Creek, with at least seven other minor tributaries. Other major waterbodies located in the SPA are Lake Desire and Shady (Mud) Lake.

The Cedar River drains an elongated basin of 188 square miles that extends westward from the crest of the Cascades to the southern shore of Lake Washington in the City of Renton (King County 1995), and out of the lake through the Chittenden Locks in Ballard. Most of the Cedar River basin is an unpopulated mountainous area that is protected from land use change and





managed for water quality protection, long term forestry, and wildlife habitat. The lowermost portion of the Cedar River basin becomes much more populated within the vicinity of the SPA.

The Cedar River watershed is approximately 90,546 acres in size, and is owned by the City of Seattle (King County 1995). It provides almost 70 percent of the drinking water to 1.3 million people throughout King County. A total of 25 wall—base tributary (WBT) streams are present in the basin, making them the most numerous habitat features in the basin, followed by percolation side channels (PSC; 14 sites), high flow side channels (HFSC), and riparian wetlands (RW) (Kerwin 2001). The lower Cedar River basin as a whole (including areas outside of the SPA) has an extensive water system that includes tributaries, high-value wetlands, lakes, aquifers, and the Cedar River itself.

Based on measured data and biological use of the Cedar River, the water quality in the river is considered generally very good by King County (1995). The Cedar River water meets or exceeds all federal standards for drinking water (Kerwin 2001). However, water quality problems such as sporadic exceedances of the state water quality standard for fecal coliform bacteria do exist. The Cedar River provides approximately 57 percent of the inflow to Lake Washington and approximately 25 percent of the phosphorus load (Kerwin 2001). The downstream reaches generally have high levels of impervious surfaces, altered hydrologic regimes, loss of floodplain connectivity, poor riparian conditions and water quality problems (Kerwin 2001).

As part of the City of Seattle's Cedar River Watershed Aquatic System Monitoring Plan, macroinvertebrate samples were collected from riffle and some pool sites within the upper Cedar River Watershed (Black and MacCoy 1999). These data were used to create a benthic index of biological integrity (BIBI) for the watershed. Many of the BIBI site scores were highly variable between sampling years. The results suggested that BIBI's developed in watersheds with a narrow range of disturbance, such as the Cedar River Watershed, may be subject to annual shifts in BIBI scores.

The urbanized tributaries to the Cedar River also show signs of declining water quality. Madsen Creek in particular has experienced a major increase in peak flow and water quality degradation since the development of Fairwood (R.W. Beck 1998). Peak flow rates have nearly doubled those estimated for forested, undeveloped conditions. The Madsen Creek ravine is typical of other areas in the Puget Sound, where urbanization, increased runoff, and glacial soil conditions have eroded ravines and creeks.

### **LAKES**

Lake Desire and Shady (Mud) Lake are the two main lakes within the S Lake Washington SPA. Lake Desire is an 80-acre lake located in unincorporated King County, approximately five miles southeast of Renton. The lake is accessed from SE Petrovitsky Road in the south portion of the SPA. Lake Desire has a 875-acre watershed, a lake area of 72 acres, and a mean depth of 13 feet (King County 2003b). The lake is developed for recreational use, with a boat launch present along the lake shoreline that receives moderate use by local residents.

Lake Desire water is very high in nutrient productivity, characterized by algal blooms in the spring and fall (King County 1996). These blooms can restrict the recreational use of the lake and dramatically impair aesthetics (King County 2003c). Lake Desire was rated as generally poor in terms of water quality when sampled in 1993 (Metro 1994).

Shady (Mud) Lake is a 21-acre lake located in the southeast tip of the SPA, south of Lake Desire and 3.5 miles northwest of the town of Maple Valley. Shady Lake has a mean depth of 21 feet, and a maximum depth of 40 feet. The lake has public access in the form of a developed shoreline and a boat launch, although there is no public park associated with this lake (King County 2003c). Shady Lake water quality was rated good in 1993 monitoring (Metro 1994).

### **WETLANDS**

Wetlands are unique environments, comprising diverse terrestrial and aquatic habitats. Biological habitat support refers to a wetland's provision of nesting, breeding, rearing, and feeding habitat for aquatic and terrestrial wildlife species. Wetlands and wetland systems within the S Lake Washington SPA offer habitat for wildlife and wetland-dependent plant and animal species. A wetland's size, connection to other wetlands and water bodies, water quality, diversity of habitat, and habitat structure affect its performance and function. Building in wetlands and in established wetland buffers is restricted and requires approvals and permits from the local jurisdiction and possibly the U.S. Army Corps of Engineers.

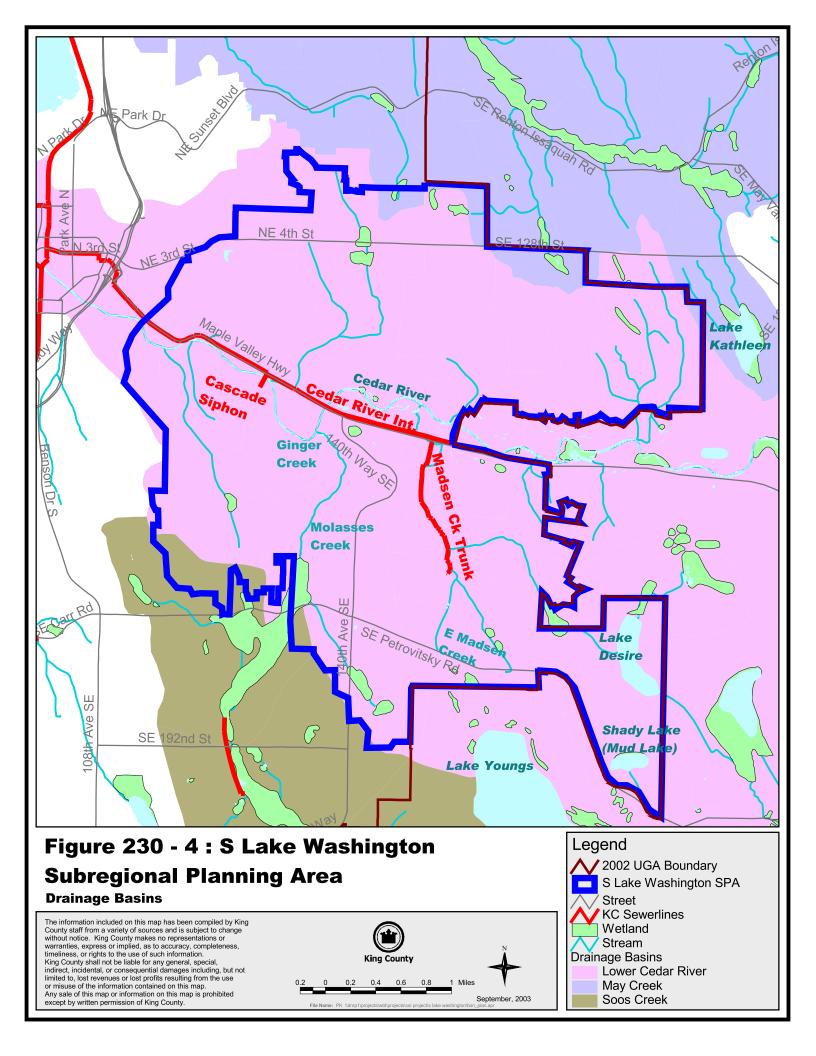
Twenty-two distinct wetlands are present within the S Lake Washington SPA (Figure 230-4). Several small wetlands are dispersed around the northern portion of the SPA, while five small wetlands are located within the Cedar River floodplain (0-2 acres in size each). There is a small wetland associated with the northern part of Lake Desire, and the majority of Shady Lake is designated by King County as a wetland (King County 2003a). Wetlands in the S Lake Washington SPA are shown in Figure 230-4.

### FLOOD HAZARD AREAS

Flood hazard areas of King County are those areas subject to inundation by the 100-year flood. These are areas that have a one percent probability of inundation in any given year. Streams, lakes, wetlands, and closed depressions all have floodplains that may qualify as flood hazard areas (King County 1997). Development in flood hazard areas is restricted or prohibited, depending on the type of flood area (e.g., flood fringe, zero-rise floodway, or Federal Emergency Management Agency [FEMA] floodways).

The majority of the Cedar River channel within the SPA is designated as a 100-year floodplain by King County (2003a). The Cedar River floodplain is the only hazardous floodplain identified by King County that occurs within the SPA.

The Cedar River has a history of flooding problems. King County estimates that over 300 homes along the Cedar River are exposed to mainstem flooding during large storm events (King County 2003c). One-third of these homes receive life-threatening flood flows, and evacuation routes for



many other homes are impassable. Commercial losses in downtown Renton due to flooding of the Cedar River have also been considerable (King County 2003b).

King County currently has a Flood Hazard Reduction Plan to eliminate the worst risks that flooding poses to human life and to reduce economic and property damage caused by flooding (King County 2003b). Most of the County's flood damage reduction efforts are focused along the Cedar River mainstem rather than in the tributaries because the most severe risks to both human safety and property are located there. Recommendations are designed to lower flood risks and damages, while reducing the long-term costs of flood damage and minimizing environmental impacts (which is consistent with the countywide Flood Hazard Reduction Plan).

### FISH AND WILDLIFE

Creeks, wetlands, and shoreline riparian vegetation in the S Lake Washington SPA can provide wildlife corridors and habitat for small mammals, migratory waterfowl, perching birds, amphibians, snakes, and water-dependent species. These areas may also be important habitat for threatened and endangered species that may occur in the study area.

The Cedar River and its tributaries are classified by King County as Class 2 streams with salmonids. Federal and state threatened, endangered, proposed, candidate, priority, and other species of concern are present in King County and can be found within the S Lake Washington SPA and throughout the Cedar River basin. The federal and state listing of these species requires that most development around these water bodies be carefully planned and that detailed biological assessments be conducted identifying impacts to listed species and their habitat.

While preparing the Cedar River Watershed Habitat Conservation Plan (HCP), the City of Seattle conducted an inventory of species that are potentially or confirmed to be present within the watershed. The City listed 21 birds, 19 mammals, 9 fish, 14 amphibians and reptiles, and 21 invertebrate species (Seattle 2000). Of all of the species listed, many are potentially present within the S Lake Washington SPA.

The S Lake Washington SPA section of the Cedar River is accessible to migratory fish (Seattle 2000). These anadromous fish are prohibited from traveling further up the river than the Landsburg Diversion Dam, which is several miles upstream from the SPA. The Ballard Locks create a challenge to fish returning to the river.

Water levels in the lower Cedar River are intentionally kept at healthy levels for proper breeding habitat for salmon. Spawning, hatching, and rearing occur year-round in the Cedar River for four protected fish species: chinook, coho, and sockeye salmon; and steelhead (King County 1995). Other recently documented species known to be present in the Cedar River are chinook, coho, and sockeye salmon, and steelhead, rainbow, and coastal cutthroat trout. Kokanee are not known to occur in the Cedar River (Seattle 1998).

Bull trout are known to occur in the upper watershed, but have not been documented in the lower Cedar River in the reach within the S Lake Washington SPA. The overall stock status for bull

trout in the Cedar River basin is unknown (Kerwin 2001). There are reproducing populations of native char in the upper Cedar River subbasin, principally associated with Chester Morse Lake. Reproducing populations of char in the lower Cedar River, Lake Washington or Lake Sammamish or their tributaries have not been confirmed.

The Cedar River posted a record run of sockeye salmon in 1988, which was the largest in the contiguous United States. However, natural runs of Lake Washington sockeye, coho, and chinook salmon and steelhead have been severely depressed. The Cedar River historically supported runs of pink salmon and chum salmon prior to the river being redirected into Lake Washington (Kerwin 2001). These wild runs are now extinct. The Cedar River watershed was estimated to support an average yearly total fish run of approximately 9,600 adult chinook salmon (hatchery and naturally produced) during the period 1968-1997 (Kerwin 2001). Reasons for the decline of wild salmon runs in the Cedar River are not fully understood, and vary considerably by species.

At least 40 non-native fish species (of which approximately 24 persist) have been introduced into the Lake Washington watershed, creating numerous new trophic interactions with native species. Rainbow trout, yellow perch, pumpkinseed sunfish, and largemouth bass are known to occur in Lake Desire (WDFW 2000). In Shady Lake, rainbow trout are stocked to supplement the lake's bass and sunfish populations (WDFW 2000).

Amphibians of concern that may occur in the S Lake Washington SPA include the Cascades frog, red-legged frog, tailed frog, Oregon spotted frog, western toad, Van Dyke's salamander, northwestern salamander, long-toed salamander, Pacific giant salamander, Cascade torrent salamander, western redback salamander, and roughskin newt. Reptiles of concern include the western pond turtle.

Birds of concern that may occur in the S Lake Washington SPA include bald eagle, common loon, harlequin duck, great blue heron, osprey, and willow flycatcher. Mammals of concern include the northern water shrew and masked shrew (Seattle 1999). The occurrence in the S Lake Washington SPA of species generally found in old growth forest areas, such as northern spotted owl, marbled murrelet, a variety of bat species, and others, is also possible but not likely.

In the lower Cedar River basin and therefore the S Lake Washington SPA in general, a combination of industrial, commercial, residential use transitioning into agricultural, and forestry are present. These activities have resulted in the following issues that affect fish and wildlife of concern (as described by Kerwin 2001):

- Numerous fish passage blockages
- Bank hardening features (e.g.: levees) that have caused scouring and reduced side channel and off-channel habitats
- Limited pool habitat with very few deep pools and instream complexity

- Lacking and low availability of refugia habitat and large woody debris (LWD)
- Degraded hydrologic connectivity to the floodplain due to streambank hardening
- Reduction in forest cover and increasing impervious surfaces
- Rechanneling of specific stream reaches that limits lateral stream migration to facilitate roads and protect property
- Inadequate and often fragmented riparian buffers
- High levels of impervious surfaces.

### **VEGETATION**

The majority of the public land in the Cedar River watershed is managed second-growth coniferous forest. Only 13,889 acres of unharvested native forest still remain in the watershed (Seattle 2000). The lower Cedar River watershed has been disturbed by human growth and development, leaving fewer riparian communities intact compared to historical conditions. The Cedar River valley contains several aquatic habitats that are outside of the mainstem channel but within the floodplain. Within the remaining vegetated areas, an insufficient number of large coniferous and deciduous trees are present for effective LWD recruitment (Kerwin 2001). Historical fires and logging practices in the lower watershed within the SPA have resulted in a lack of large old-growth trees, snags, and logs along the river (Seattle 2000).

The Cedar River watershed is within the Western Hemlock vegetation zone, which was described by Franklin and Dyrness (1973). Along the corridor of the Cedar River, the riparian vegetation consists mainly of mature, conifer-dominated forest. Red alder (*Alnus rubra*) is present in patches where breaks in the conifer vegetation occur (Seattle 2000), and mixed coniferous and deciduous stands are present in several areas, where they are mainly found in forested wetland and riparian habitats.

Major vegetative species that may be present within the SPA include Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), and red alder, with less abundant populations of true firs, Sitka spruce (*Picea sitchensis*), big leaf maple (*Acer macrophyllum*), and vine maple (*Acer circinatum*) (Seattle 2000). Douglas fir and western hemlock dominate both pure and mixed stands. The shrub layer in the SPA forested areas is generally dominated by vine maple, salal (*Gaultheria shallon*), and sword fern (*Polystichum munitum*) in enclosed canopy areas, and salmonberry (*Rubus spectabilis*) and other *Rubus* spp. in open canopy forested areas (Seattle 2000).

Non-native species that are introduced either accidentally or are intentionally planted as ornamentals can devastate natural communities, out-competing native species, and alter their

host habitats. Nine introduced, non-native plant species are known to be present in the Cedar – Sammamish Watershed. One of the most visible is the Eurasian watermilfoil (*Myriophyllum spicatum* L.), which was introduced into Lake Washington in the 1970's (Kerwin 2001). Eurasian watermilfoil is a fast-growing plant that forms a dense canopy on the water surface. The plant can interfere with recreation, inhibit water flow, and can impede navigation (Newman 2003). It is possible for this and other invasive plants not previously identified in the area to be present in the S Lake Washington SPA.

# LAND USE AND GROWTH

### LAND USE

This section describes existing and potential changes in land use practices and forecasted growth within the S Lake Washington SPA. This assessment is based on forecasted changes in population and the distribution of residential, commercial, and industrial development in the area. Planned sewerage conveyance systems are discussed in the comprehensive sewerage plans of the City of Renton, the Soos Creek WSD, and the Cedar River WSD. Other existing and proposed land use information is also derived from these documents and the King County Comprehensive Plan (2001). Understanding these land use and growth areas within the S Lake Washington SPA will help the county plan for its sewer conveyance system requirements through the area. Figure 230-5 shows expected land uses under the King County Comprehensive Plan (King County 2001) (note that Figure 230-5 does not depict all currently projected uses within incorporated areas).

The Metropolitan King County Council established an urban growth area, which includes portions of the City of Renton (King County 2003a). The King County plan requires future growth and development to be confined to the urban growth area to limit urban sprawl, enhance open space, protect rural areas, and provide for more efficient use of human services, transportation, and utilities. The King County plan includes capital facilities and utilities elements that identify the county's current regional wastewater conveyance and treatment system and facilities. The plan also identifies a review and approval process for sewer plans within the county. Each local service agency in the S Lake Washington SPA has developed and adopted sewer plans in accordance with the King County Comprehensive Plan.

In the upper Cedar River, the preservation of forests is the main land use priority (Kerwin 2001). The entire basin upstream of Landsburg (about two-thirds of the total river basin) is currently protected from future development inside Seattle's Municipal Watershed (King County 2003d). This land will be further protected by a prohibition on commercial logging and the decommissioning of 38 percent of its existing roads under Seattle's Cedar River Watershed Habitat Conservation Plan (HCP).

A mix of residential and commercial forestry and agricultural land uses generally characterizes the land around smaller streams in the Cedar River basin. Residential, industrial, and commercial uses prevail in the area around the lower reaches of virtually all the streams throughout the Cedar River basin (Kerwin 2001). Land uses in the lower basin, which lies within the S Lake Washington SPA, range from the Renton urban center to adjacent suburbanizing areas to rural and forest zones in the east.

The neighborhood of Fairwood, which is situated within the City of Renton, comprises the majority of the S Lake Washington SPA. Fairwood is predominantly single family residential with multi-family apartment complexes and commercial activity at the Fairwood Shopping

Center on SE Petrovitsky Road (Penhallegon 2000). The remainder of the western area is farmlands, pastures, and single family residences.

## **GROWTH**

The Puget Sound Regional Council (PSRC) prepares long-range population, household, and employment forecasts for the four-county Puget Sound region (King, Kitsap, Pierce, and Snohomish counties). These forecasts are prepared to ensure a general consistency with local comprehensive plans developed under state Growth Management Act guidelines.

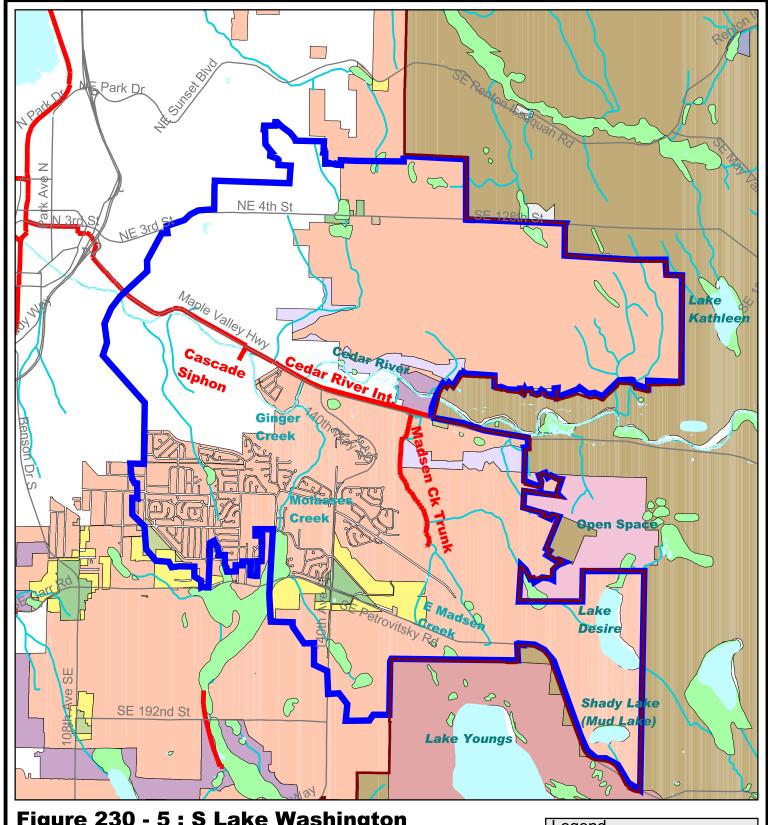
Overall, the central Puget Sound grew by 526,952 people (or 19.2 percent) between the 1990 Census and the 2000 Census. The central Puget Sound regional population was estimated to be 3,190,000 million people as of 1999, with a total population of 3,275,847 in 2000 (PSRC 2003). The Cedar River basin is home to a growing population estimated at 55,400 in 1990 and projected to be 93,000 by 2010 (King County 1995).

Growth in King County decelerated noticeably in 1999. The county gained only 11,200 persons (or 0.67 percent), to reach 1,677,000 during 1998-99, compared to an increase of 19,600 persons or 1.19 percent during the previous year (PSRC 1999). However, several census tracts situated along or in close proximity to the Interstate 405 and Interstate 90 corridors in Renton witnessed major population growth. The City of Renton grew by 8,364 people (or 20.1 percent) between the 1990 and 2000 censuses, reaching a population of 50,052 in 2000.

Local population forecasting is performed by first forecasting population, employment, and income for the Puget Sound region as a whole, then allocating these forecasts among small geographic areas, called forecast analysis zones (FAZs). Forecast analysis zones generally approximate existing boundaries, such as municipal jurisdictions and community planning areas, and are therefore useful in predicting growth in specific areas of the region.

The seven forecast analysis zones in which the S Lake Washington SPA is partially or completely located are shown in Figure 230-6. Projected household, population, and employment growth by forecast analysis zone in the S Lake Washington SPA (PSRC 2003) are shown in Table 230-1. The largest population and household increases (as a percentage) between 2000 and 2030 are expected to occur in the Renton Highlands, Panther Lake, and East Renton forecast analysis zones. Total employment percentages are expected to increase most in the Lake Youngs and Renton Industrial forecast analysis zones.

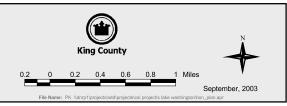
Expected growth in the S Lake Washington SPA is expected to vary between FAZs, but all areas are expected to increase in population over the next few decades. Overall, forecast analysis zones covering the S Lake Washington SPA (Figure 230-6) are expected to see an additional 13,516 households (a 32.8 percent increase), 23,637 new residents (a 22.2 percent increase), and 32,010 new jobs (an 80 percent increase) between 2000 and 2030 (PSRC 2003).

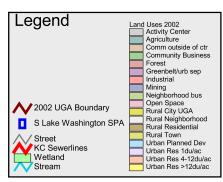


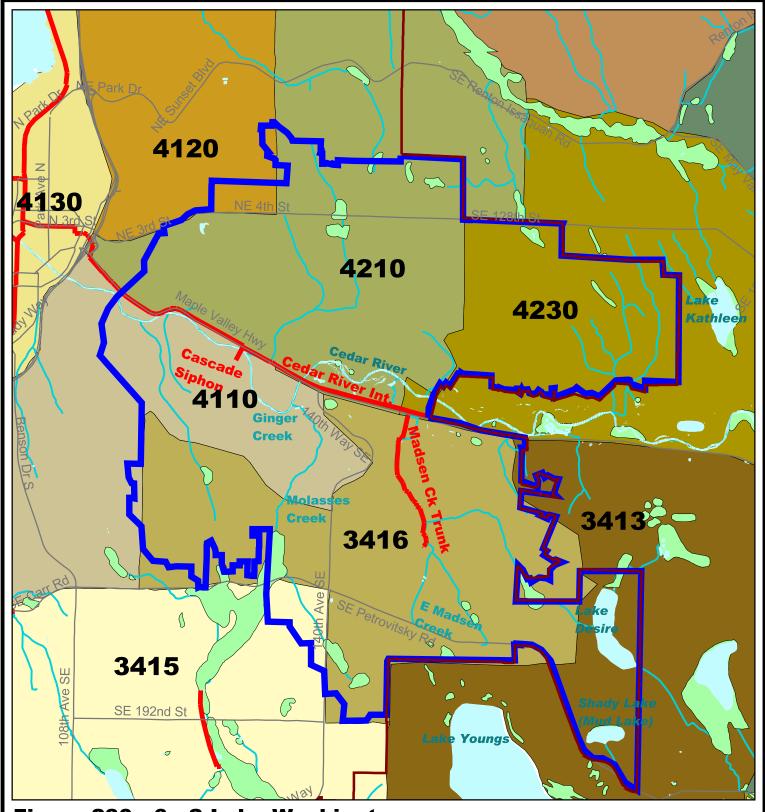
# Figure 230 - 5 : S Lake Washington Subregional Planning Area

### **Land Use Plan**

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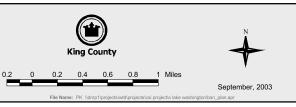




# Figure 230 - 6 : S Lake Washington Subregional Planning Area

**Forecast Analysis Zones** 

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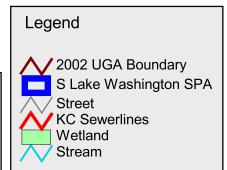


Table 230-1. Current and Projected Household, Population, and Employment Growth by Forecast Analysis Zone in the S Lake Washington SPA.

	То	Total Households		To	Total Population			Total Employment	
Forecast Analysis Zone	2000	2030	Change	2000	2030	Change	2000	2030	Change
3413 Lake Youngs	2,327	3,099	33.2%	6,613	8,333	26.0%	555	1,303	134.8%
3415 Panther Lake	7,309	10,290	40.8%	20,436	28,549	39.7%	4,901	7,859	60.4%
3416 Fairwood	7,749	9,030	16.5%	20,856	21,639	3.8%	2,452	4,549	85.5%
4110 Renton Industrial	6,957	8,980	29.1%	16,679	19,272	15.5%	26,487	49,487	86.8%
4120 Renton Highlands	7,322	10,578	44.5%	16,829	21,817	29.6%	2,497	4,517	80.9%
4210 East Renton	6,197	8,528	37.6%	15,622	19,187	22.8%	2,439	3,418	40.1%
4230 Renton Plateau	3,353	4,225	26.0%	9,527	11,402	19.7%	672	880	31.0%
Total Average Change	41,214	54,730	32.8%	106,562	130,199	22.2%	40,003	72,013	80.0%

Source: Puget Sound Regional Council data (PSRC 2003).

Renton is currently conducting planning efforts to move toward its regional growth center goals. As part of the city's regional growth center designation, Renton has agreed to accept 7,417 new households within the regional growth center in order to help achieve the desired mix of housing, jobs, and shops (PSRC 2002). In 2000 the Renton Regional Growth Center had reached 17,184 employees, 90 percent of its 2000 employment target. The mix of jobs in the Renton center is influenced by the presence of the Boeing Company and other manufacturing and industrial companies. Renton still has some remaining vacant and underused land in the historic downtown, which offers a limited capacity for new development. The city center includes a portion of the Cedar River and Lake Washington shorelines, and has a mix of uses. Community shopping, residential, and industrial uses share the area with office space, civic, and governmental functions (PSRC 2002). The land use element of Renton's comprehensive plan shows the old downtown area (southern part of the regional growth center) as commercial, and the north end (Boeing) as industrial.

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